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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/025,119	12/19/2001	Ari Hamalainen	3865/0K109	5808

4955 7590 09/14/2005

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EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	**PAPER NUMBER**
2638	

DATE MAILED: 09/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/025,119	HAMALAINEN, ARI	
	Examiner	Art Unit	
	Emmanuel Bayard	2638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This is in response to amendment filed on 7/5/05 in which claims 1-14 are pending. The applicant's amendments have been fully considered but they are moot based on the new ground of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olivier et al U.S. Patent No 6,512,802 in view of Zhang U.S. Patent No 6,404,809 B1.

As per claims 1 and 13-14 Olivier teaches a method for performing channel equalization in a receiver (see fig.3 element 50 and col.2, lines 49-55) in which a signal is received from a communication channel, the signal containing symbols formed of binary information by phase shift keying (see col.2, line 50), channel estimation is performed to estimate the properties of the communication channel, and samples are taken of the received signal at intervals (see fig.3 element 58 and col.4, line13), wherein in the method, a determined number of samples are examined (see col.4, lines 26-40 and col.5, lines 28-40), a decision step is taken, in which, to find out the transmitted symbols, the bit decisions are computed (see fig.3 element 60 and col.7, line 2-45) and col.9,lines 48-55) on the basis of said defined quantity of samples, wherein upon iteration of said decision step, at least some of the bit decisions of the previous decision

step are used in addition to the samples under examination, in the computation of the bit decision (see col.7, line 2-45).

However Olivier does not teach after each decision step examining whether said decision step is to be iterated.

Zhang teach each decision step examining whether said decision step is to be iterated (see col.5, lines 29-31, 65-67 and col.6, lines 1-5).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Zhang in Olivier as to estimate the specific digital impairment mapping levels by performing a digital impairment learning procedure as taught by Zhang (see col6, lines 10-15).

As per claims 2 and 6, Zhang does teach performing said decision step (see col.10, lines 11-12 cost function). Furthermore implementing a cost function which is defined as f (B) = 1 2 t = 0 T (; r t - s = 0 H - 1 h s S (B t - s) r; 2 - s = 0 H - 1 h _ s h s S _ (B t - s) S (B t - s) + k = 1 M (b t , k - 1 2) 2) ,in which S(B) is the symbol corresponding to bits B, h.sub.s are the estimated channel coefficients, and r is the received signal which is sampled, and that said cost function is subjected to minimization into Olivier would have been obvious to one skilled in the art as to estimate the specific digital impairment mapping levels by performing a digital impairment learning procedure as taught by Zhang (see col6, lines 10-15).

As per claims 3 and 7, Olivier does teach an update rule (see col.7, line 29). Furthermore implementing an update rule which is defined as l , k (j + 1) = f h (t = l l + H - 1 re { r _ t h t - l S (B l) b l , k } - re { h _ t - l S _ (B l) b l , k q = 0 , t - q l H - 1 h q S

(B t - q) }) ,is used, where B.sub.l=.left brkt-bot.b.sub.l,1, b.sub.l,2, . . . , b.sub.l,M.right brkt-bot. is M bits at the moment l=u+l.DELTA.u, S(B.sub.l) is the corresponding symbol, 10 S (B l) b l , k is a derivative with respect to k bits, h indicates the communication channel, of which H channel taps are estimated, and f.sub.h (x) is a hard limit function which receives the value 1, if x>0, else 0 into Olivier would have been obvious to one skilled in the art as to determine whether the number of iterations completed equals a predetermined iteration as taught by Olivier (see col.7, lines 29-35).

As per claim 4, Olivier would teach wherein in the update rule, noise is added before taking said decision step as to determine whether the number of iterations completed equals a predetermined iteration.

As per claim 8, Olivier does teach comprising computing units, each of which are arranged to determine one symbol value on the basis of said defined number of samples, and the output of each computing unit is coupled to the input of at least one other computing unit, for using the symbol values defined by the computing units in the next computation of the bit decision (see col.3, lines 17-30 and col.5, lines 11-35).

As per claim 9, Olivier does teach wherein each computing unit contains as many iteration blocks as the bit number of symbols formed in the modulation (see col.3, lines 17-30 and col.5, lines 11-35).

As per claim 10, Olivier would teach wherein the means for examining the number of samples determined each time comprise (delay line) in which the number of delays is one less than the number of symbols to be determined from said defined number of samples as to determine whether the number of iterations completed equals a

predetermined iteration.

As per claim 11, Olivier would teach means for adding noise in the update rule before computing said bit decisions as to determine whether the number of iterations completed equals a predetermined iteration.

As per claim 12, Olivier teaches comprising means for setting an initial value (see col.3, lines 20-30) for the bits before computing said bit decisions.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Haller et al U.S. Patent No 6,182,261 B1 teaches an efficient iterative decoding.

Molnar U.S. Patent No 5,887,035 teaches a method for joint equalization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vanderpuye Kenneth can be reached on 571 272 3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Bayard
Primary Examiner
Art Unit 2638

9/9/05

EMMANUEL BAYARD
PRIMARY EXAMINER